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The Public Health Journal

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Hieronymus Fracastorius de Contagionibus, Morbisque Contagiosis et Eorum Curatione, Libri Tres

By THE HONORABLE WILLIAM RENWICK RIDDELL, LL.D., D.C.L., etc.,

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THIS, I think, is the most interesting and illuminating of all Fracastorius' voluminous writings: it was first published in 1546. It consists of three Books—the first on Contagions generally, the second on Contagious Diseases, and the third on their Treatment.

The first does not treat of Syphilis specifically, and I pass that book over for the time being.

In the second book, after chapters on Contagious Fevers, Variolae and Morbilli, Pestilential Fevers, Differentiae of Pestilential Fevers, Lenticulae, their Causes, True Pestiferous Fevers, Contagious Phthisis and Rabes, comes Cap. XI,

De Syphilide morbo seu Gallico, which I translate:—

Now let us pass to those contagions which chiefly attack the exterior, beginning with the disease Syphilis.

In truth among other marvels, our time has witnessed a new disease long unknown to our hemisphere which has filled almost all Europe, and no small part of Asia and Africa. It invaded Italy, in fact, about the time the French under King Charles occupied the Kingdom of Naples (1) about ten years before 1500, from whom the name was given to the disease, Gallicus: the French, however, retaliate on us by calling the disease Italian: the Spaniards call it, Patursa: the Germans sometimes Mevius (2), sometimes Gallicus—some, imposing a new name, call it Pudendagra, which is derived from Pudenda in the same way as Mentagra, which is derived from Mentum [the chin] and of which Pliny writes that it was a new disease so named by the ancients—we [*i.e.*, Fracastorius] in our lighter works (4) called it Syphilis.

This disease (5), heretofore unknown in our hemisphere, they say is very common in certain regions which the Spanish navigators discovered—a new world where that contagion abounded to the widest extent, and was as well known a disease as Scabies (6) is with us.

When it appeared first among us, these characteristics were conspicuous—in some, it appeared without any contagion contracted; in some (and they were the greater number) it was caught by contagion; not, it is true, by everyone, nor at once, but only when two bodies became heated by mutual contact, generally in coitus, in which way most were infected. Still a few infants were seen who were infected by sucking from the mother or nurse. This disease does not leave a "Fomes" (7), or at least only in very serious cases; nor does it propagate itself to a distance (8); but, again, it does not manifest itself immediately, but it lies dormant for a certain time, sometimes for a month, often for two and four months.

In the meantime, however, there are symptoms of the disease having been caught—a certain melancholy in the mind, lassitude in the body, and facial pallor, and what is seen in most cases, certain small ulcers formed around the pudenda, not dissimilar in appearance to those which are wont to arise from fatigue, which they call "Caries" (9), but very different in nature—for the former are persistent, and on being subdued in one part, regerminate in another with perpetual self-propagation. After these, certain crustose pustules break out in some cases, the greater number beginning on the scalp, in others on other parts; these at first appear small, then gradually they grow to the size of an acorn cup (10), and not dissimilar to those in boys which are called "Achores" (11). There is a great variety in these; in some they are small and drier, in others larger and more fatty—in some growing livid, in others slightly whitish (12), in others again harder and reddish—all, however, after a few days open and drip a certain fetid, mucilaginous mucor; and it passes all saying what a quantity of this mucor constantly flows and what *sordities* appears. Then they begin to exulcerate by corrosion, like those ulcers which are called phagedenic, and sometimes attack not only the flesh but even the bones themselves.

In those in whom the disease attacks the upper parts, foul drippings appear, which in some eat away the palate, in some the uvula, in some the fauces, and in some the tonsils—in some the lips are consumed, in some the nose, in some the eyes, and in some the whole pudenda. Moreover, for the most part large gummosities appear in the members, making a great deformity, for often they equal in size an egg, or even a loaf, in which when opened there is apparent a white mucilaginous mucor—this tenacious *callus* (14) occurs chiefly in the arms and thighs,

which sometimes ulcerate and sometimes continue thus till death.

In addition to all these—as though they were of little moment—severe pains attack the arms often accompanying these pustules, sometimes before, sometimes after—and they of long duration (and nothing can be more severe) afflict the patient chiefly at night; the pain is not, properly speaking, in the joints, but around the arms and the nerves.

Nevertheless, it is true, pustules sometimes appear without pain, and sometimes pain without pustules, but in most cases both afflictions are present.

In the meantime, all the members are languid, the body is emaciated, there is no desire for food, no sleep, but melancholy, continued irascibility and desire to lie down, while the face and the thighs swell—sometimes a sort of low fever accompanies, but rarely—in some cases there is headache; this pain is persistent and yields to no medicine. If blood be drawn, it is seen to be turbid and mucous, the urine is too thick, oily, sedimentary (15) and reddish, by which symptoms alone in the absence of fever we have foreseen many to have been attacked by this disease. The faeces are difficult and mucous and dry—by these symptoms those who were suffering from the disease were known.

We here speak of the affllicted in the past tense, because although this contagion is still in full vigour, still, after the first period, it seems changed; for beginning about twenty years ago, the pustules appeared fewer, the gummosities more in number than they had been in the first years; then, too, the pustules, if any did appear, were drier, and the pains, if any did occur, were sharper in every patient. Later, the years passing by, about six years before the present time, there was again a great change in this disease—in very few, indeed, do pustules now appear, and almost no pains at all, or much less severe; the gummosities are, it is true, many, and—what seems marvellous to everybody—the falling of the hair of the head and elsewhere makes men almost ridiculous, some coming to view without beard, some without eyebrows, some with a shining pate. This misfortune was at first thought due to the medicines, particularly mercury; but later everyone, becoming better informed, knew that it came from the disease itself thus changed—and what is worst of all, now in many cases the teeth become loose, and in some cases even fall out.

De Causis, Cap. XII

When this new disease appeared for the first time, at once a great controversy arose among medical men, some contending that there was no mention of it by the ancients, others on the contrary contending that there was; some of these thinking it was Elephantiasis, others what was

called by the Arabs, Safati, by others Lichenas (16). The first to solve the difficulty was Nicholas Leonicenus (17), a man most profoundly learned and of great weight, who clearly showed that it was none of these, but that the disease had not been mentoined among the ancients. Although, indeed, some later writers, rather obstinately than reasonably, disagreed with so great an authority and asserted it to be simply Elephantiasis—of which we shall say something a little later (18).

Moreover, of those who have so far treated of the disease, some seem to say rather what it is not, than what it is; others seem to have investigated rather the rationale (19) which is concerned with the form, what the disease might be in composition, in combination and alone, while they left untouched the materia and principia (20)—others, indeed, touched on the materia, the principia too, and the rationale, but did not pursue the subjects as they should.

We, indeed, in our lighter works (4), which we dedicated to Pietro Bembo, now Cardinal, when by chance driven to the country by pestilence we had much leisure, wrote concerning all these as specifically as the poetic art would admit—as that art did not permit everything; but it was necessary for us to omit a good deal which we consider would be worth while if now pursued.

So far, then, as pertains to the first origin of the disease, some have thought that it was brought to us from the New World which the Spanish navigators reached, where this affection is very prevalent; as proof of this they advance this, that the disease first appeared amongst us when that navigation was effected and intercourse had with that people, and then it was first seen among the Spaniards; consequently they consider the infection to consist in contagion from one to another.

But, in fact, even although the greater number of mortals have contracted this disease by contagion, yet innumerable others have been observed to have become affected without contagion and *per se* (22).

Moreover, it would be impossible in so short a time for a contagion which is so sluggish in its nature, and is not readily caught, to have traversed so much territory if first introduced among the Spaniards by one ship—since it is established that it was seen at the same time, or about the same time, in Spain and France and Italy and Germany and almost all Scythia.

Add to this that, certain years before, astronomers had predicted it; and it is no small indication that the origin of it lay elsewhere than simply contagion (23). Now, it should not seem strange that new and unaccustomed diseases should appear at certain times, not being brought from one region to another, but arising from their own causes—in the year 1482, a certain kind of pleuritis broke out which affected nearly

all Italy; and in our own times appeared what had never before been seen, Fevers which they call Lenticulae (24), concerning which we have treated in the Text above; and some years before we saw also a contagious Lippitudo (25) invade some cities. Moreover, we saw the plague commonly afflicting cattle alone which we spoke of above (26).

NOTES

(1) The invasion of Naples by the French under Charles VIII began in 1494; he conquered the Kingdom, but retired precipitately in the face of the League of the Pope and the Emperor. He died in 1498, when he was preparing for another invasion.

(2) The Spanish name Patursa seems to have quite died out even in Spanish countries—at least, the medical men in Cuba and Venezuela whom I have consulted know nothing of it. The modern name in Spanish is Sifile. Du Cange does not mention the word Patursa in his voluminous *Glossasium Mediae et Infimae Latinitatis.*

Mevius seems equally unknown in Modern German; in any case, it should be Morbus Sancti Maevii, not Morbus Mevius.

Giovanni de Vigo, physician to Pope Julius II, in his *Practica in arte chirurgica çopiosa,* lib. v. published in 1514, says that the Spaniards called it *las baus* (*i.e.,* the pocks), the Genoese *lo male de le tavelle,* the Tuscans *lo male de le Bulle,* the Lombards *lo male de le brosule;* other names are we know Saint Sement's disease, St. Evagrius' disease, St. Mein's disease, Spanish disease, &c., &c. Jacques de Bethencourt was the first to give it the name Venereal Disease, Morbus Venereus, in 1579. See Note 23, post. In Iwan Block's well-known work *Der Ursplung der Syphilis* (Jena, 1901) a simple list of the names given to the disease fills 18 pages, pp. 297-315.

(3) "Pudendagra" is formed like Podagra, Chiragra. The termination "agra" became a familiar ending for disease much as our modern *itis;* and, like *itis,* although of Greek origin, it was often attached to Latin roots, thereby forming words convenient enough but a horror to the philologist. Pleuritis, phlebitis, etc., are quite proper; but what can be said for 'vulvitis'? But the practice is found in other cases—telegram (which the meticulous said should be telegrapheme) is from two Greek roots and allowable; but what of the hybrids, cablegram, Marconigram, etc?

Pudendagra was a disease of the pudenda, the parts concerning which we should be modest—the conception that pudenda are something to be ashamed of and not simply modest concerning, is post-Greek and post-Roman; it has done, and is still doing incalculable harm. The disease syphilis was sometimes called Mentulagra, from mentula, the penis.

"Mentagra" is formed from "Mentum", the chin, and the suffix *agra;* it means a disease affecting the chin; the word is hybrid, but in good classical use.

Plinium Secundus in his *Naturalis Historia* in lib. XXIV, 2, has much to say about this mysterious disease.

Speaking of the diseases new and previously unknown, he says (I translate freely): "The most serious of these they called by a Greek name, "Lichenas"; in Latin, because, as a rule, it began at the chin, at first jocularly (as is the saucy nature of many in respect of the afflictions of others), and then regularly,

"Mentagra"; in many cases attacking the whole face except the eyes, and descending to neck, chest and arms with a foul scurf of the skin. This affection was unknown among our forefathers, and it broke into Italy for the first time about the middle of the reign of Tiberius Claudius Caesar [A.D. 41-54], a certain Roman Knight, Perusinus, a Quaestorial Scribe, bringing in this contagion when it had appeared in Asia". Pliny goes on to say: "And it often happens that new genera of diseases attack a whole community". "Mentagra" is still occasionally used for Sycosis and Porrigo lupinosa.

(4) "in nostris lusibus". Fracastorius in his prose writings always calls his poetry "lusus", play, games, amusement—what our English writers generally with great modesty call "trifles".

(5) The text reads "morbo", a clear misprint for "morbum", as, indeed, the Venice edition of 1584 reads—the words I translate "in our hemisphere" are "nostro orbe", our orb.

(6) "Scabies". In cap. XIV of this Book, Fracastorius treats of Lepra properly so called and Scabies; of Scabies, he says: "Psora, again, which we call Scabies, is a less severe affliction than Lepra, passing, as it does, over into Lepra as Lepra into Elephantia . . . the Greeks, indeed, seem by the name Psora to mean that form of Scabies which is dryer and savors a little of melancholia (black bile); consequently they use the word Psora in a more restricted sense than we do Scabies".

In the same book, Fracastorius tells us that "Scabies also arises from salty phlegm "salt rheum", commonly identified with the Greek Psora. But 'Psora' with the Greeks signified what is called in Italy Impetigo, Melancholica Passio and Via ad Lepram—or if it did signify Scabies at all, it was what is called Sicca Scabies (Dry Scabies)—the Greek do not seem to have had a common name for all forms of Scabies".

Scabies down to very recent times had a wide connotation, including many diseases. The exceedingly interesting and amusing article on Scabies, written by my very dear friend—Valde dilectus deflendusque—Sir William Osler, should be familiar to all who take an interest in the history of medicine. How many know that Napoleon was believed to have died from "suppressed itch"?

(7) "Fomes". It is impossible to understand much of what follows without a comprehension of Fracastorius' theory of Contagions, contained in the first Book of this and in his other prose works. Briefly, it may be thus stated: Contagion is defined as an infection by one body to another of the same kind, and is first made in insensibly minute particles—*i.e.*, in modern terminology, it is not molar but molecular.

There are three kinds of Contagion: (1) by touch only, (2) by touch and "fomes", and (3) by touch, "fomes" and action at a distance.

The contagions that infect by touch alone, such as blights from apple to apple, grape to grape, begin with the innate heat and moisture being evaporated by the action of some external heat either in the air or in some surrounding humidity. Once the contagion has begun, the course is clear—"particles insensibly minute, hot and moist, evaporate from the infected body; by their moisture, they soften, relax and render more easily separable the particles of the adjoining body, and by their heat they raise and separate them. The result is thus stated:—"unde dissolutio mistionis sit evaporante calido et humido innato quae putrefactio erat"—"whence comes a dissolution of the body by the evaporation

of the innate heat and moisture—which (dissolution) is putrefaction". These "calidae et humidae insensibiles particulae quae evaporant" combine to form "Seminaria contagionum" the seminaries, nurseries, seeding ground of contagions.

2. So far, the author is wholly confident; but of the second class, viz., those which infect by touch and also by fomes, Fracastorius is not so sure. These are found in such diseases as Scabies Area, Pestilentia Phthisis, Elephantiasis and the like; they not only infect by touch, but also leave behind "fomes", that is, clothes, wood, etc., which are not, indeed, infected, but the seeds of infection are preserved in or on these materials and can infect bodies similar to those from which they were derived. The particles in the "Seminaria contagionum" on the "fomes" may be preserved for two or three years, while those which evaporate from merely putrescent bodies cannot last so long—but no one should from these facts infer that the cause is different, "since the very same particles which evaporate from the first body may be preserved (reservari) in the 'fomes', and, so preserved, may have the same effect as when they first evaporated". That they may be thus preserved is to be expected when one considers how the smell of smoke and soot is retained by walls—this depends on two things, the minuteness (subtilitas) of these particles and their resistance to change (fortitudo et constantia); the former enables them to penetrate and hide in the pores (foramina) and the latter to withstand much and persistently. It is not to be supposed that all minute evaporated particles find a nidus in "fomes"; as to those which are not viscid (lentus) or are not dry by nature (per se), or do not abound in much moisture, or are liable to rapid changes, it is impossible that they can infect what they touch; and they leave behind no "fomes", because either they do not adhere and become agglutinated or they are quickly changed. Moreover, it is not everything that can act as "fomes", but only such substances as are porous (foraminulenta) and warm or very little cold; in these the nurseries of contagions can hide in the pores; consequently iron, stones and such like non-porous and cold substances are not fit to become "fomites", but wool and clothes and many woods are.

3. The contagions which act at a distance present much difficulty—they are found in such diseases as Pestilential Fevers, Phthisis, certain Lippitudes and those Exanthemata which are called Variolae and the like; it must be remembered that all of this class infect also by touch and by "fomes".

Fracastorius gives what seem to him to be strong reasons for the view that these last contagions are of a different nature from the others—some pestilential fevers kill in ten or twelve hours, the patient not feeling heat or cold; a "lippus" makes another lippus, "but this new one is not affected like the former; the penetration of these contagions is instantaneous; and, in the twinkling of an eye (as the saying is), they course through the whole animal and kill". The conclusion is reached that "alius impetus, alia vis esse videtur harum contagionum et venenis, aut Catablephae animali assimilari, non autem reliquarum contagionum modum et naturem sequi", *i.e.*, the impulse and force of these contagions seem to be comparable to poisons or the catablepha (the basilisk), and not to follow the form and nature of the other contagions.

The author, wisely, is not satisfied to refer these Contagions to "occult properties"; and, not so wisely, he devotes a whole chapter of metaphysical subtilties to show why.

The mere fact of action at a distance should not astonish us for "quis

putaret e cepe et allio lacrymas nobis vel e longinquoe elici—e pipere, iride, ptharmica, sternutamentum—e croco, solano stricno, somnum consiliari—e tractione metallicorum apoplecticum hominem fieri?" "For who would think that tears would be wrung from us by an onion or garlic even at a distance; sneezing by pepper, iris, ptharmic; sleep could be procured by the crocus, the solanum strisnum; a man become apopletic from the handling of metals"? (Perkins' Tractors had not been discovered yet!) "Of course", he adds, "insensibly small bodies exhale from all these, and they are carried around and have different effects and faculties". For, as these exhaled or emitted particles are reduced to as small dimensions as possible by the air and carried in all directions, up, sideways, and finally downwards, they are able to form nurseries not only in "fomes" but also in the air, which last some time—not so long, however, as in the "fomes". These nurseries adhere to the "humors" and generate new nurseries, etc., until the whole mass of the humors is infected.

Another way is by attraction, the nurseries being sucked in by the breath or dilatation of the veins, then going from the smaller veins to the larger, and at length reaching the heart.

(8) "Ad distans", *i.e.*, of the third genus of Contagious—see the preceding note.

(9) Some texts (not, however, the Venice edition of 1584) read "Caroli" instead of "Caries". "Caroli" (or "Taroli") was a name given by the ancients, somewhat vaguely indeed, to the ulcers produced on the penis (Caries pudendorum), particularly between glans and prepuce, subpreputial sores, whether caused by excess or by the woman being foul, having secret ulcers or menstruating. The authors make it difficult to differentiate, but the word "Caroli" may cover herpes, balano-posthitis, even the chancre or chancroid.

(10) "cooperculi glandis"—acorn-cup. The word "cooperculus" is not known in Classical Latin; and Du Cange is silent. "Operculum", however, for a lid or cover is used by Cicero, Pliny and others.

(12) "Achores"—the Greek term; the word sometimes meant *crusta lactea* and sometimes *porrigo larvalis;* in late Latin the usual name was Latume; the Arab name Saphati, Pliny translated "Running ulcers of the head"—they are crustose, sordid, infections in the head, chiefly of children. Some of the ancients, apparently including Fracastorius, considered them due to phlegm.

(13) "leniter exalbide": "exalbidus", whitish, a favourite word of Pliny's—see *Nat. His.*, 12, 17, 39; 24, 19, 112; 23, 1, 22; I do no find it used by another author of classical times.

(14) "callus" or "callum" is properly the hardened thick skin on animal bodies. Pliny uses the word as describing the soles of the feet—see *Nat. Hist.*, 9, 35, 54; 22, 25, 60—and Cicero has "calceamentum solorum callum". *Tusc.*, 5, 22, 30.

(15) "divulsa" literally means "torn apart"—here it has the metaphorical meaning of "divided into fluid and sediment". Fracastorius' claim that Syphilis can be detected by Uroscopy alone is interesting, but wholly without foundation in fact.

(16) "Safati" or "Saphati", see note 12, *ante.*

"Lichenas". Celsus' Papulae, commonly called Volaticae, supposed to be caused by phlegm become salty "salt rheum". Pliny says that this disease was brought into Italy in the time of Pompey the Great. He recommends ripe figs as a

remedy, *Naturales Historae*, 23, 63—they "excite urine, relax the bowels, promote perspiration and help in papulae". "The juice of the fig also eradicates hair and cures scabies of the eyebrows, also lichen and psora"—while the leaves are used "in rubbing lichen".

(17) Nicholas Leonicenus, (1428-1524), born at Lunigo, a physician of note, Professor at Ferraro, translator of Hippocrates' *Aphorisms*: the first to write on Syphilis in his *Liber de epidemia quam Itali morbum gallicum vocant*, Venice, 1497. He had the same views as Fracastorius as to its astrological origin and its existence in antiquity. He says: "Nostro hoc aevo insolitae naturae Italiam et multas alias regiones invasit".

(18) Fracastorius deals with Elephantia in cap. XIII of this Book as follows: "Elephantia or Elephantiasis is called by the Greek Elephas. Some of the later writers believed Elephantia to be the same as Syphilis, because seeing the ancient writers dealing separately with Lepra and Elephantia, and thinking their Lepra to be the same as what is commonly called Lepra, they did not know what Elephantia could be but Syphilis. But what the ancients call Lepra is not that commonly so named, but a far different and less serious disease considered by them along with Psora, that is, Scabies. It is really a sort of half-way house to Elephantia, which itself, properly speaking, is the disease which is called Lepra not only by the people but also by the recent Latin as well as Arabian physicians. Elephantiasis, Pliny in the 26th Book of his *Naturalis Historia* tells us, was unknown in Italy until the time of Pompey the Great, and like Lenticulae it begins at the nose".

What Fracastorius refers to is to be found in cap. 5 of Pliny's *Nat. Hist.*, which is as follows:

"Elephantiasis was unknown in Italy till the times of Pompey the Great; and it often began on the face, first in the nose, like lenticula, then traversing the whole body, the skin spotted, vari-coloured and rough, sometimes crass, sometimes tenuous, sometimes hard . . . at length blackening and pressing the flesh to the bones, the fingers and toes swelling".

Resuming now our author:—

"What the Arabians call Elephantia is not the same as that so called by Greeks and Latins; but is a kind of swelling of the feet from melancholic humor like a kind of Varix—the form of Lepra in which the feet swell like an elephant's.

The true Elephantiasis has these symptoms: it begins without pain or fever, and some time elapses before it shows itself; then in time there arises, generally first on the nose, a small blackish lenticula—then the skin shows difference in colour, hardness, roughness, attenuation, sometimes livid, sometimes white, sometimes reddish black, here hard, there smoother, elsewhere rough and squamous, still elsewhere crass and like leather hardened by fire. At the same time hard pustules are formed on the whole body, mostly purplish, which in course of time ulcerate and emit pus, not copiously, indeed, and drier than in Syphilis. The members swell, in many the nose is eaten away, the mouth drawn on each side toward the ears, the eyes are rounded (staring), like those of Satyrs as painted, whence the disease is often called Satyriasis, "quanquam sunt qui Satyriasim dictum putent propter tentiginem nimium veneris, quae eo in morobo contingit", although some there are who think it called Satyriasis on account of the excessive desire for venery which occurs in this disease.

It may be said here that modern lexicographers are equally divided as to the reason for the application of the name "Satyriasis" to Elephantiasis—the better opinion seems to be that indicated in the Sydenham Society's Lexicon, (1897), "Satyriasis, an old term applied to a variety of Elephantiasis Graecorum or Leprosy on account of its hideous appearance"—it can scarcely be said that the leprous "a toujours la verge tendue que les Satyres" (to use the words of Littré, Dict., *sub voc.*, "Satyriasis").

To resume:

The disease has its name Elephantiasis from the swelling of the digits of the hands and feet, so that the feet are like those of elephants, although Archigenes says it is so called from the magnitude of the disease itself.

The small veins under the tongue become, as it were, varicosed, pruritus sets in, and with it "tentigo veneris vehemens"; later they become fetid and intolerable; with many the skin becomes wholly white, which form is held incurable.

This disease is contagious by touch, by fomes, and even by breathing, although contagion is slow—and it propagates itself—it is more prevalent in men than in women and very few eunuchs are attacked, for which reason we read that some have had themselves castrated lest they should be attacked. The very hot and the very cold climates suffer more from it than the temperate, as Aetius says on the authority of Archigenes; consequently the Germans, the Scythians, the Egyptians and the Arabs suffer most (although Galen appears to contradict Archigenes, saying that the Germans and Scythians escape it), the Italians and the Greeks less; and, in reality, the disease is rarely seen in Italy, although in cities, houses, called Hospitals, are built and furnished at public expense for cases of Elephantiasis. "But of those patients whom I have so far seen, none or few of those received, had Elephantiasis; they were only leprous or suffering from a certain severe impetigo."

Elephantiasis is referable to the melancholic humor, as is chiefly shown by the pustules, hard, dry and purple, as well as the hardness and roughness of the skin. Men are more liable to it than women, because they have more melancholic humor; it is slow because it consists in crass humor.

(19) "Ratio" referring to the old Rational as opposed to the Empyrical system of Medicine. The "Ratio" of a disease was often evolved from the inner consciousness of the physician like the camel of the German philosopher.

(20) "Materia" the substance, actual or imaginary, in which the contagion worked, generally one of the "humors". "Humors" are the four supposed fluids of the body upon the proper condition and mixture (crasis, temperamentum) of which the health depended so much. Sangius, (blood), phlegma or pituita (phlegm, rheum) chole or cholera (yellow bile) and melancholia (block bile, melancholy).

(21) "in iis lusibus". See note 4 ante.

(22) *pe se.* A disease arises *per se* when it occurs without contagion, by what Dr. Beale and his school called Spontaneous Generation; a disease is *per se* what it is in itself, the necessary substance, though the "accidentia" may vary.

(23) Scythia was Russia, Poland and an indefinite amount of the Balkans and Austria.

Here we should consider Fracastorius' argument for the non-American origin of Syphilis.

He gives three reasons for his opinion that it did not come from the New World.

1. Its Spontaneous appearance, *per se*, in many who had not been exposed to contagion.

2. Its simultaneous or practically simultaneous appearance in widely separated regions.

3. Its prediction by Astrologers.

1. The spontaneous development of Syphilis has never been proved; nor has it to support it anything but bare assertion. From the very beginning, almost all the writers on the disease agreed that the symptoms showing themselves on the genitals were the result of infection in coitus. It is true that some, like Fracastorius, missed the significance of the chancre even if they knew of its existence. Fracastorius, it will be seen, does not give the chancre as the initial lesion; he gives a graphic and an accurate description of the second incubation after the chancre and before the secondary symptoms as though that were the first incubation before the first appearance of any external symptom—malaise, general languor, moroseness, depression, pallor—the chancre was with him when he saw it, a mere local and secondary symptom, not a primary lesion.

Others knew better, for example, Jacques de Bethencourt in his *New Penitential Lent*, published at Paris in 1527, gave the name Venereal Disease (morbus venereus) to syphilis, because in his view every disease should be called after its cause. He objected to it being called Naples disease, French disease, the great pox, elephantiasis, lichen, impetigo, ment(ul)agra, pudendagra morbus magnatus, St. Sement's disease, St. Job's disease, etc., etc. He was the first to use the name Venereal Disease; and the use of this name was made almost universal by the more celebrated Jean François Fernel (Fernelius), Physician in ordinary to Henry II of France in his excellent work, *De Luis Venereae Curatione Perfectissima*, Antwerp, 1579 (edited by Dr. Gisselin, a physician of Bruges), a work frequently reprinted. (He, by the way, had such an opinion of the Arabian and the Latin writers on Medicine, that he said: "Faeces Arabum, melle Latinitatis condidit"). De Bethencourt makes it abundantly clear that in his view, the first symptoms appear on the genital parts, penis or neck of the womb (Matricis cervix)—why not vulva does not appear—if from nurse to suckling, on the mouth—always the parts which have been exposed to contagion.

Giovanni de Vigo, afterwards physician to Pope Julius II, (inventor of "Vigo's Plaster") is equally clear; in his *Morbus Gallicus*, the Fifth Book of his *Practica in Arte Chirurgica*, 1514, (also 1518), he says: "The first symptoms . . . are almost invariably on the genital organs, the penis or vulva. They consist of small ulcerated prominences, sometimes brownish and livid, sometimes even black, sometimes somewhat whitish. These are circumscribed with a collar of hard callus": and so with many other writers of that century.

2. There is as little evidence of the simultaneity of the outbreaks in widely separated regions. We have, indeed, appalling accounts of the rapid spread of the disease and the terror it produced: the people fled those afflicted with it, the magistrates forbade their entering inns or frequenting public places—thousands died under the open sky in the streets and byways, even the lazarhouses were closed to them, and physicians dared not treat them. In 1497, a Decree of the Parliament of Paris commanded strangers with the great pox to quit the capital within twenty-four hours on pain of the halter, and the resident sick of the disorder

to confine themselves within their houses, day and night, under the same penalty: this not being effectual, the Prévôt of Paris made an Ordinance the next year that all sick with the great pox should leave the city at once on penalty of being thrown into the River. Everywhere physicians were at a loss and many declined, even where not forbidden, to treat the syphilitic, with the result that the treatment of syphilitics became part of Surgery, not Medicine—the barber surgeon was the nearest approach to a professional man, as a rule, who attended such cases; and he was not uncommonly ousted by the quack-salver.

So appeared and spread the disease in all countries; but no evidence has ever been adduced to show that the disease spread more rapidly than was to be accounted for by sexual congress with the infected.

3. At the present time, the successful prophecies of Astrologers would not be considered as of any consequence. Then, however, it was different: Judicial Astrology was held in honour and had a Chair in more than one university: Fracastorius, himself, was skilled in the pseudo-science. We shall see when we come to his poem, that he attributed the Black Death, the *Peste Noire*, which desolated Europe in 1348, to a conjunction of Saturn and Mars. *Syph.* lib. I, vv. 132, *sqq.*

What he means is that a similar conjunction had occurred often before and with the same results: therefore, the disease must have existed before and the new conjunction brought it on again.

(24) "Lenticulae". The lenticulae, puncticula or peticulae, intermediate between the pestilential and non-pestilential fevers, and from which many die and many rcover, is rather to be called malignant than pestilential; it appeared in Italy in 1505 and 1528, but was long well known in Cyprus and adjoining lands, Adreas Naugerius, Ambassador of Venice to Francis, King of France, died of it, "VIII Idus Maii", May 8, 1529—the disease is of the first class, contagious only by touch, and that only slowly.

It is, I think, clear from the description that what is meant is Peticulae in the sense of Petechiae, Purpura maligna, Porphyra Graecorum: these are said sometimes to occur without fever, Purpura simplex.

(25) "Lippitudo". I have written a long note on this term, but consider it out of place here: it here is clearly Ophthalmia purulenta or puriformis.

(26) "Pestem illam solis bobus communem". In the first Book of *De Contagionibus*, cap. XII *De alijs differentijs contagionis, i.e.,* concerning other differentia of Contagion, Fracastorius, speaking of *contagiones communes, i.e.,* epidemic or endemic contagions, tells of the "pestilences such as that which traversed Greece, of which Thucydides writes, and such as that which appeared in our own time in Italy, called Lenticulae by some, Puncticula by others. We refer, too, to an unaccustomed contagion in the year 1514, which attacked cattle only, first seen around Forojuliensis (Frejus), then gradually carried to the country of the Euganei (*i.e.,* Northern Italy), and thence into our own region (*i.e.,* around Verona). At the beginning, the cow abstained from food without manifest cause, then the cow herds, looking into the mouths of the cattle, a certain roughness and small pustules were seen in the palate and the whole mouth. It was necessary to separate the infected animal at once from the rest of the herd, otherwise the whole were infected. By degrees the disease worked down into the legs and then to the feet; in cases where this took place, nearly all got better, but where it did not, the most part died". (A good account of Foot and Mouth Disease.)

Various Pathological Conditions Which Affect The Progress of Cardiac Cases

By Dr. George Smith

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The question of the etiology of Endocarditis is still far from being settled. The paper which is to follow this will give some idea of the work that has been done and the theories that have been advanced in an effort to solve this problem. It may even be that the successful solution of the cause of the disease may add very little new in the treatment of Endocarditis.

In this paper advanced cases of Endocarditis will not be considered. One is not able to accomplish much in children in which there is broken compensation. They are usually the end result of that type of case which is met occasionally in which the whole history is one of progressive Endocarditis in spite of any measures which may be used to help the patient. If not of this progressive nature but more chronic, it means they have not had the early care and supervision which is necessary to arrest the disease. Children's hearts have wonderful recuperative power, and especially in the early cases in which the heart has not had time to become badly damaged, marked results are often obtained by careful handling after the removal of such pathological defects as diseased tonsils, etc. These cases are very much like early tuberculosis, both as regards treatment and results.

At the Hospital for Sick Children, it is customary to admit each new patient with Endocarditis for a thorough investigation. Cases of recent infection are kept in bed for a prolonged period, it being felt that this is the time to effect the greatest corrective results. It is pretty generally felt by all observers that the correction of physical and pathological defects has an important bearing on the course of the disease. Without going into any argument as to the importance of the tonsils as an etiological factor, I think all will admit that the presence of a focus which may tend to cause secondary infections is a menace to any case with a damaged heart. It is thought that this passing infection may set up an exacerbation of the primary condition, causing the Endocarditis.

The disturbance of the naso-pharynx by tonsillectomy has been claimed by some to be analagous to the acute infection of the tonsils. As

Read before the Pediatric Section of the Academy of Medicine, Toronto.

a result, the argument has been advanced that it is dangerous to remove these foci of infection while the Endocarditis is chronic or still subacute. The question as to the proper time for the removal of tonsils in such cases is a debatable one. After watching closely the immediate results of tonsillectomy in a series of such cases in the wards of the hospital, the writer is of the opinion that there is more danger in waiting too long than operating too quickly. In a few cases so-called reactions, such as elevation of temperature, quickened pulse, were observed for a few days, but never any worse than that one sees often in patients without heart damage, and certainly no worse than the upset experienced by a child at the time of a parental infection. During the past few months, Dr. Mary Cowan has been making blood cultures before and after operation on cases of Rheumatic Fever, Chorea and Endocarditis. This was done because it has been claimed that tonsillectomy in these cases often lights up the original infection, causing a bacteraemia. The second culture was made 48-60 hours after the operation. In no case was a positive culture obtained. One realizes, of course, that a negative result is not necessarily conclusive.

If the foci of infection are to be removed as early as possible, what should be our guides as to the proper time to act? In a general way the appearance of the patient is a good guide. As will be mentioned later, a fair percentage are malnourished and anaemic. While these conditions, unless extreme, should not stop operation, still it is felt that they should be corrected as much as possible before operation. It is rather a good plan to put the patient on a proper diet to see if the weight will increase a few pounds before proceeding. Sometimes with badly diseased tonsils or teeth it is impossible to make much improvement. Under these circumstances the operation should not be delayed, everything else being favourable. By many, the temperature is the chief guiding post. I am not so sure that fever should have as much importance attached to it as is generally the case. That type of patient in which there is a slight elevation of temperature, extending over a few weeks, may be accounted for by the infected tonsils. Those in which the temperature is caused by the Endocarditis present are easily diagnosed by the general condition of the patient, and by the heart's tolerance for exercise. The latter is probably the best guide, as it tells the condition of the heart muscle accurately. The heart's tolerance for exercise, combined with the appearance of the patient, appears to the writer to be the chief guides as to the time of operation.

Having removed all possible foci of infection, the problem now is to put the patient on the best plane possible that his efficiency may be developed to the greatest extent.

In many ways, as mentioned above, these patients with damaged hearts are very similar to patients with tuberculosis. It is quite possible that our treatment in the past has been concentrated too much on the heart. The importance of having a 100 per cent. blood supply, a well nourished body, fresh air, sunshine, rest, and the proper amount of exercise, has not been emphasized sufficiently.

The examination of a survey made along this line of 15 cases of Endocarditis at present on the Boys' and Girls' wards at the Hospital for Sick Children, illustrates this point. Adopting the rule of calling all children undernourished when the weight is 10% below the average weight for its height, we find that 10 of 15, or 66%, were underweight. In this group one child was 30% underweight. The average weight for the group was 11% below normal. A usual accompaniment of this condition is a poor development of the chest. The scapulae project, the thorax is flattened and the abdomen prominent. All but two of this group showed some degree of abnormality along this line. Three were markedly abnormal, seven moderately abnormal, and three slightly abnormal.

An examination of the blood showed an average haemoglobin of 74%. The highest was 80%, the lowest 55%. The red cell count was somewhat unusual, there being seven counts over five million, with none below four million. The explanation of this relatively high red cell count is uncertain. However, the outstanding point is that all 15 of these cases were under par in one, two or all three (*i.e.*, anaemia, underweight, chest deformity). It seems scarcely necessary to say that it would be impossible for these children to offer a normal resistance to any type of disease, nor does it seem possible that any heart could reach its highest state of efficiency with such a handicap. While the handicap may not be great, it may be the determining factor in the welfare of any child. It is a natural conclusion, therefore, that these defects should be remedied as much, and as soon, as possible.

What steps may be taken in regard to the lowered haemoglobin? At present about 8 of the cases mentioned above are having blood transfusions, small amounts, 200-300 c.c. injected slowly, being repeated at intervals of a week. This would appear to be the easiest course to pursue, when the cases are in the hospital. Along with this it is intended that special blood producing diets, as suggested by Whipple's work in anaemia, shall be used both in the hospital and at home. Whipple and his co-workers have studied carefully the blood regeneration in animals with simple anaemias. They found that the greatest progress was made with a mixed diet in which the potent factors were liver, lean beef, and spinach. They found that a diet rich in carbohydrates and practically protein-

free except for milk, permits a very slow regeneration curve taking 5-6 weeks. The diet suggested by them for a child 8-12 years contains:

Total for the day:

Milk, 720 c.c.
Orange, 1.
Beef, 1 serving, 90 gm.
Liver, 2 slices, 70 gm.
Spinach, 4 tablespoons, 90 gm.
Egg yolk, 2.
Egg, 2.
Sugar, 3 teaspoons.
Cereal, 3 tablespoons, 60 gm.
Baked potato, 130 gm.
Applesauce or baked apple, 1 serving.
Stewed fruit or prunes, 1 serving.
Oil, 2 tablespoons, or mayonaise, 1 tablespoon.
Zwieback, 4 pieces.
Butter, 4 small balls.
Bread, 2 slices.
Pureed vegetables in soup.
Protein, 83; fat, 120; carbohydrates, 180; calories, 2144.

It is interesting to note in this connection that this group of workers has carried on a series of experiments on the value, in simple anaemias, of certain preparation of iron and arsenic taken by mouth and given subcutaneously. Such preparations as Ovoferrin, Blaud pills, Fowler solution, Sod. Cacodylate, were used. They say that no drug has been tested which can compare with the meat factors in stimulating a rapid regeneration of the haemoglobin during these anaemia periods produced by simple haemorrhage. These carefully controlled experiments give no support to the time-honoured custom of administering iron, etc., in conditions of simple anaemias.

Besides diet, sunlight plays an important part in helping these patients. In this connection, one should remember the brilliant results being reported by those working with some forms of tuberculous disease. Certain changes in the blood have been demonstrated due to the sun's rays. Not only are the red cells and leucocytes increased in number, but the haemoglobin is improved. Recent work is bringing this type of treatment much to the fore. Just how much good may be derived in this way, not only in curving anaemia, but also as a curative measure in the disease itself, remains to be seen.

Along with sunshine baths, the patient may have periods of rest and abundance of fresh air. Such a procedure must result in the heart re-

ceiving to the very greatest degree, the proper amount of oxygen and food for metabolism in the first place, and as perfect an elimination of the products of metabolism in the second. Particularly will this be true if the proper amount of exercise be given in each particular case.

In this respect in our treatment, I think we are far more likely to impede the heart by curtailing its work than we are to damage it by overwork. The amount of exercise is regulated by the time it takes for the blood pressure or pulse-rate to return to normal after exercise. In normal hearts, for moderate exercise, this takes about 2-3 minutes. In damaged hearts with a weakened myocardium, this may be increased to 6-10 minutes. The amount of exercise therefore, which any patient may safely be permitted to take depends upon its response to exercise and the rapidity with which it returns to normal. This can easily be worked out by moderate exercise, including stair climbing. There is no occasion to restrain a child with a heart of normal tolerance. The exercise itself should be an invigorating tonic if properly conducted.

SHOWING ANAEMIA, UNDERWEIGHT AND CHEST DEFORMITY IN 15 CASES OF ENDOCARDITIS. (H. S. C. WARDS)

Case	*Age*	*R.B.C.*	*Hb.*	*Weight*	*Chest Deformity*
W.C.	10 yr.	4,640,000	80%	—10%	marked
S.P.	5 "	5,280,000	70%	—19%	moderate
M.A.	13 "	5,800,000	75%	Normal	moderate
L.G.	11 "	4,300,000	80%	—12%	marked
F.M.	12 "	5,056,000	75%	—25%	moderate
R.M.	5 "	5,120,000	75%	—11%	moderate
M.F.	4 "	4,864,000	75%	— 8%	slight
M.R.	13 "	4,768,000	75%	—10%	slight
F.W.	10 "	4,800,000	55%	— 1%	slight
V.G.	8 "	4,480,000	70%	—20%	none
M.M.	7 "	5,216,000	76%	—11%	moderate
E.L.	10 "	4,524,000	85%	—30%	marked
H.S.	9 "	5,122,000	73%	— 1%	moderate
J.C.	5 "	4,160,000	75%	—14%	moderate
G.W.	6 "	5,200,000	75%	Normal	none

Early Autolytic and Bacterial Transformation of Fish Muscle Proteins.

A Preliminary Note*

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THE chemical composition of fish muscle from a good many species has been accurately determined. Acid and enzyme hydrolysis studies have increased the knowledge of the composition and added information on the products of chemical transformation. There is very little information available, however, upon the very important question of the early chemical changes which go on in dead fish muscle. Such considerations as the initial rate of chemical change, the nature of the substances undergoing change, the extent to which autolytic enzymes or bacterial processes are concerned have not received any detailed experimental examination. It would appear obvious too that information concerning the initial stages in these processes is fundamental to any consideration of methods of handling fish for market either fresh or preserved. The following data represent a preliminary set of observations made by the writers at the Atlantic Biological Station, St. Andrews, during the summer of 1924.

I. *Experimental Methods and Quantitative Results with Fresh Haddock Muscle*

As a preliminary procedure we decided to measure the content of ammonium nitrogen and soluble nitrogen, and later we included non-coagulable nitrogen, in the muscle of perfectly fresh haddock; after the muscle had been kept for various periods in contact with the bacteria normally present in the gut and surface slime of the fish and after keeping the muscle under toluol in order to inhibit the development of bacteria but not to appreciably retard the activity of the autolytic enzymes.

1. An ample supply of fresh fish was provided by a fifty hook trawl which was set about half a mile off the station dock when fish were required. This was hauled one to two hours after setting and only living haddock selected for experimental use, these were taken to the

*This report is based upon work carried out by the writer with the assistance of R. G. Sinclair and Minnie M. Lenz at the Biological Station, St. Andrews, N.B.

laboratory and used at once, within five to ten minutes after death. The fish were rapidly filleted, the fillets ground in a meat chopper, samples weighed into beakers and covered with watch glasses for incubation or directly into the reaction flasks. The ground muscle was then covered with water or dilute NaCl solution, infected with gut and slime bacteria or covered with a two to three millimeter layer of toluol. Total, soluble, and non-coagulable nitrogen and ammonium nitrogen determinations were made on fresh samples and on samples incubated for intervals up to 48 hours at 25° C.

2. *Total Nitrogen.*—About ten gram samples of the meat were weighed into 500 c.c. Kjeldahl flasks and digested with 15 c.c. concentrated H_2SO_4 together with 2 c.c. of one per cent. copper sulphate solution for one hour at a boiling temperature. At the end of this time the liquid was green and homogeneous. After cooling the contents of the flasks were diluted with 200 c.c. of distilled water, an excess of NaOH over the amount required to neutralize the H_2SO_4 and a small bit of paraffin was added and the mixture distilled in the usual manner into N/5 H_2SO_4 and titrated with N/5 NaOH. The results calculated as grams of nitrogen per 100 grams of wet weight of muscle are shown in Table I. Such variations as are shown in the list are partly the result of variation in the moisture content of the samples. If this is taken into account the results are satisfactorily uniform.

3. *Soluble Nitrogen.*—About 20 gram samples of ground meat were weighed into beakers, covered with about 300 c.c. of distilled water and thoroughly stirred. The fluid was then decanted through a filter to a Kjeldahl flask and successive 20 c.c. portions of distilled water to make a final total volume of 100 c.c. stirred up with the meat and decanted through the filter. The nitrogen in the filtrate was then determined as in the former case. The results of several tests are shown in Table I, where it will be observed that soluble nitrogen makes up about one-fourth of the total nitrogen content.

Samples prepared in this way were incubated at 25° C. for varying periods and the soluble nitrogen determined. Instead of an increase in soluble nitrogen as anticipated, following softening of the meat and an increase in ammonia, a decrease was observed. The extent of the decrease is shown in Table II. The cause of this unexpected result has not so far been investigated in detail, but it apparently results from a gradual coagulation of certain of the nitrogen compounds of the muscle, probably proteins. Soluble nitrogen obviously, therefore, could not be used as a measure of autolysis or decomposition unless this precipitation could be prevented; no such method was found.

4. *Non-coagulable Nitrogen.*—In view of the failure of soluble nitrogen determinations to yield satisfactory results non-coagulable nitrogen

TABLE I.—TOTAL, SOLUBLE AND NON-COAGULABLE NITROGEN AND AMMONIUM NITROGEN IN THE MUSCLE OF FRESH HADDOCK

	Nitrogen per 100 grams wet weight			
Lot No.	Total	Soluble	Non-Coagulable	Ammonium
	Grams	Grams	Grams	Grams
I.....	2.61			
II.....	2.58			
III.....	2.58			
IV.....	2.42			
V.....	2.64			
VI.....	2.60	0.67		
VII.....	2.47	0.61		
VIII.....	2.57	0.67		
IX.....	2.47	0.65		0.010
X.....	2.70	0.71		
XI.....	2.69	0.65		0.014
XII.....	2.64	0.74		0.012
XIV.....	2.71		0.27	0.008
XV.....	2.61		0.29	0.010
XVI.....	2.74		0.31	0.011
XVII.....	2.56		0.31	0.008
XVIII.....	2.73		0.31	
XIX.....	2.68		0.32	
XX.....	2.71		0.33	
XXI.....	2.75		0.33	
XXIV.....	2.79		0.35	
XXV.....	2.70		0.32	
A.....				0.014
B.....				0.010
C.....				0.008
D.....				0.008
E.....				0.012
F.....				0.012
G.....				0.010
M.....				0.006
Average...	2.64	0.66	0.31	0.010

determinations were resorted to. In this procedure about 30 gram samples of the ground muscle were weighed into beakers covered with 40 c.c. of distilled water and allowed to stand one hour. Twenty cubic centimeters of tannic acid reagent was then added (9 parts 15% tannic acid, 1 part glacial acetic acid) and allowed to stand for thirty-five minutes after which the fluid was decanted through a filter into a Kjeldahl flask. The meat was washed in the beaker with three 20 c.c. volumes of water which were decanted to the same filter, and finally the meat was placed on the filter, further washed with a fine stream from a wash-

bottle and allowed to drain. The results with fresh muscle shown in Table I indicate that this method gives uniform results. It appears that approximately half the soluble and one-eighth of the total nitrogen exist in this form in the fresh mascerated muscle.

One set of determinations was made on the same lot of fresh mascerated muscle, using tannic acid in one case as the coagulating agent and sodium tungstate and sulphuric acid in second. In the latter case after the sample had stood for an hour covered with water 10 c.c. of 10 per cent. sodium tungstate solution was added when with constant stirring 20 c.c. of 2/3 N H_2SO_4. This was allowed to stand thirty-five minutes and washed as in the case of the tannic acid coagulation. In this case the tannic acid treated sample showed 0.33 grams, and the tungstic acid treated sample 0.35 grams of nitrogen in the respective filtrates. In the subsequent examinations comparing fresh, autolysing and decomposing muscle the tannic acid reagent was used.

TABLE II.—Soluble Nitrogen in Fresh Haddock Muscle and after 24 Hours and 48 Hours Exposed to Bacterial Action

	Fresh	After 23-25 hrs.	After 47-50 hrs.
VI.....	0.67	0.62	
VII.....	0.61	0.53	
VIII.....	0.67	0.62	0.59
IX.....	0.71	0.55	
X.....	0.65	0.68	
XI.....	0.65	0.55	
Average.....	0.66	0.59	0.59

5. Ammonium Nitrogen was determined by Folin's method adapted as follows: Fifty gram samples of the ground muscle was covered with an equal volume of water and allowed to stand for an hour, the entire mass was then placed on a Buchner asbestos filter and slowly washed with six 20 c.c. volumes of water. Three grams of sodium carbonate were added to the filtrate and rapid aeration continued for three hours. The results of the examination of fresh muscle shows some variation, more than could be accounted for by the weighing of the fresh moist muscle, due probably to insufficient washing or aeration. The average of the several determinations, however, probably gives a reasonably accurate figure and the method was the same for fresh samples and the material after standing so that the results are comparative.

It may be noted that these observations on the content of total, soluble, non-coagulable and ammonium nitrogen correspond very closely with previous determinations made in a similar manner. Table III shows a comparison of our results with those of Smith[1] and Perlzweig and Gies[2] on the muscle of summer and winter flounder.

TABLE III.—COMPARISON OF THE NITROGEN CONTENT IN FRESH HADDOCK MUSCLE WITH PREVIOUS DETERMINATIONS ON OTHER FISH

	Nitrogen per 100 grams			
	Total	Soluble	Non-coagulable	Ammonium
	grams	grams	grams	grams
Summer flounder.....	3.44			0.019
Winter flounder.....	2.89	0.96	0.38	
Haddock.....	2.64	0.66	0.31	0.010

II. *Autolysis*

Samples of muscle prepared as described in the previous section were ground and weighed into beakers and mixed with distilled water or 0.1 to 0.5 M NaCl, as noted later, covered with 2 to 3 mm. of toluol and incubated at 25°. Determinations of non-coagulable nitrogen and ammonia were made on the fresh material and after periods of incubation up to 50 hours.

Bacteriological examination indicated that while this treatment with toluol did not completely sterilize the mixture it prevented any development of bacteria during the incubation period. Any hydrolysis taking place, therefore, must have resulted from activity of enzymes of the tissue.

The results of analyses are shown in Table IV, where the amount of non-coagulable and ammonia nitrogen in fresh muscle and after periods of incubation of 23 to 25 and 47 to 50 hours are recorded in respective columns. Comparison of the figures for the non-coagulable nitrogen will show that for the same time of incubation the amounts are quite constant as in different samples of the fresh material. The increase, it will be noted, is very slight during the first twenty-four hours and much greater during the second twenty-four hours and autolysis.

The content of ammonium nitrogen, as noted previously in the fresh samples, shows some variability. A somewhat greater degree was noted in the incubated samples. It will be noted from Table IV

[1]Smith, C. S., *Biochem. Bull.* 3, 54-68-1913.

[2]Perlzweig, W. A. and Gies, W. J., *Biochem. Bull.*, 3, 68-71, 1913.

that there is no increase during the first five to six hours of incubation, a considerable increase during the next eighteen to twenty hours and a slightly less conspicuous increase during the second twenty-four hours.

The autolytic changes stand in sharp contrast to the results of bacterial action discussed in the next section.

TABLE IV.—AUTOLYSIS. NON-COAGULABLE NITROGEN AND AMMONIUM NITROGEN IN FRESH HADDOCK MUSCLE AND AFTER THE MUSCLE HAS BEEN KEPT UP TO 48 HOURS UNDER TOLUOL

	Non-coagulable Nitrogen			Ammonium Nitrogen			
Lot No.	Fresh	After 23-25 hrs.	After 47-50 hrs.	Fresh	After 5-6 hrs.	After 23-25 hrs.	After 47-50 hrs.
	Grams	Grams	Grams	Grams	Grams	Grams	Grams
XIV....	0.27	0.32		0.008		0.035	
XV.....	0.29	0.30		0.010		0.024	
XVI....	0.31	0.32	0.34				
XVII...	0.31		0.36	0.011	0.010	0.017	
XIX....	0.32	0.33	0.34				
XX.....	0.33		0.37				
XXIV...	0.32		0.37				
XXV....	0.35	0.36	0.37				
IX.....				0.010			
XI.....				0.014			
XII.....				0.012			
A.....				0.014			
B.....				0.010			
C.....				0.008			0.050
D.....				0.008	0.008	0.028	0.052
E.....				0.012			
F.....				0.012			
G.....				0.010	0.012	0.034	
N.....				0.006	0.008	0.028	
Average.	0.31	0.33	0.35	0.010	0.010	0.028	0.051

III. *Autolysis and Bacterial Action*

A second set of samples was prepared as described in the previous two sections, weighed into beakers and covered with an equal volume of distilled water or 0.1 to 0.5 M NaCl, as noted later, and incubated at 25° for periods up to 50 hours. The samples prepared in this way were always infected with bacteria from the gut and the slime of the exterior of the fish. In these preliminary experiments no attempts were made to work with pure cultures of bacteria, a very difficult matter where the action on uncooked flesh is desired. It was demonstrated by

cultures, however, that these samples of mascerated muscle contained a flora of at least four predominating species of bacteria together with smaller numbers of several other species; moreover, it was found that the conspicuous bacteria were those which made up the greater number in the gut and slime of the fish.* In a few experiments the addition of a culture of the most active proteolytic species of bacteria from the gut of the haddock to the already contaminated mascerated muscle did not conspicuously increase the rate of hydrolysis over those samples infected in the course of filleting the meat.

Results of analysis of non-coagulable nitrogen in mascerated fish muscle thus under the influence of the enzymes of the tissue and the bacteria are shown in Table V. There was slightly greater irregularity

*Considerable data has been accumulated concerning the bacteriology, the numbers, the constancy of occurrence and the classification of the bacteria of the intestinal canal of marine fish. This will form the subject of a later report.

TABLE V.—Autolysis and Bacterial Action: Non-coagulable and Ammonium Nitrogen in Fresh Haddock Muscle and After the Muscle had been Acted upon by Bacteria and Autolytic Enzymes for 24 and 48 Hours

	Non-coagulable Nitrogen			Ammonium Nitrogen			
Lot No.	Fresh	After 23-25 hrs.	After 47-50 hrs.	Fresh	After 5-6 hrs.	After 23-25 hrs.	After 47-50 hrs.
XIV....	0.27		0.36	0.008			
XV.....	0.29	0.29		0.010			
XVI....	0.31	0.32	0.50		0.16	0.026	0.080
XVII...	0.31		0.49	0.011			
XVIII..	0.31	0.33	0.42				
XIX....	0.32	0.33	0.52				
XX.....	0.33		0.44				
XXIV...	0.32		0.37				
XXV....	0.35	0.38	0.53				
IX.....				0.010		0.012	
X.....						0.028	0.084
XI.....				0.014			0.024
XII.....				0.012		0.066	0.094
A.....				0.014	0.016	0.018	0.049
B.....				0.010		0.019	0.065
C.....				0.008			
D.....				0.008			
E.....				0.012	0.010		
F.....				0.012			
G.....				0.010			
N.....				0.006			
Average.	0.31	0.33	0.45	0.110	0.014	0.029	0.064

in different samples than in the former case where only autolysis was concerned due probably to different degrees of infection and variation in the species of bacteria present. The content of non-coagulable and ammonium nitrogen, it will be observed from Table V, increases during the first twenty-four hours only slightly more than under the influence of the tissue enzymes alone; but during the second twenty-four hours of the combined tissue enzyme and bacterial action the rate of protein transformation increases enormously over the action of the tissue enzymes alone.

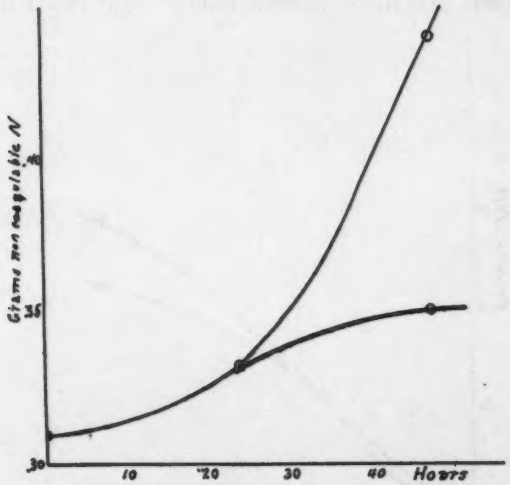

Fig. 1. Curves showing the increase in non-coagulable nitrogen. Ordinates represent grams ammonium nitrogen, abscissa time in hours. The lower curve represents the action of autolytic enzymes only, the upper curve bacterial action in addition to autolytic action.

Comparison of the relative influence of autolysis and bacterial decomposition has been facilitated by plotting the data. In Fig. 1 the content of non-coagulable nitrogen in plotted as ordinates and the time of incubation at 25° as abscissa for both the autolytic action (data from Table IV) and autolytic and bacterial action combined (data from Table V). The comparatively slight influence of the bacteria for the first eighteen to twenty-four hours, and the increasingly rapid action for the next twenty-four hours, is apparent. In Fig. 2, where the ammonium nitrogen data are plotted in the same way, similar but slightly less conspicuous differences between autolysis and bacterial action are apparent.

There are probably several factors concerned in the relatively slow rate of bacterial action during the first part of the incubation. The bacteria initially entering the tissue diffuse more or less slowly. It is quite possible that there are bacteriocidal substances in the freshly-mascerated tissue which are gradually destroyed by the autolysis, but it is probably that the most important factor is that many bacteria grow more rapidly on the simple products of tissue autolysis than on the complex proteins. This is probably true even of bacteria, which themselves produce active proteolytic enzymes.

It is possible that quite different results might be obtained with a

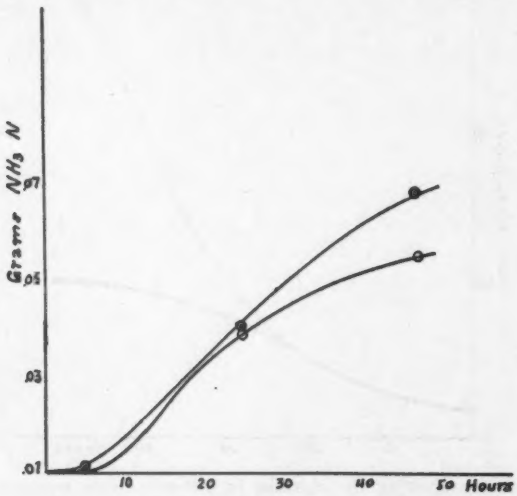

Fig. 2. Curves showing the rate of increase in ammonium nitrogen in mascerated haddock muscle. Ordinates represent grams ammonium nitrogen, abscissa time in hours.The lower curve represents the action of autolytic enzymes only, the upper curve bacterial action in addition to autolytic action.

different preparation of the samples. Gross[1], for instance, found that bacteria developed considerably more rapidly in the gills than any other part of the fish. The inclusion of gill tissue or blood in the samples might therefore result in a relatively greater degree of bacterial action.

IV. *Influence of Salt and Acidity*

A small number of samples of fresh meat were mascerated, as in the previous cases, and covered with dilute sodium chloride solutions instead of water, and analyzed for both non-coagulable and ammonium

[1]Gross, E., Report 6, Honorary Advisory Council Scientific and Industrial Research

nitrogen both with and without toluol. No conspicuous difference in the rate of hydrolysis was observed in water or in salt concentrations up to 0.5 m. Higher salt concentrations were not tested.

In the experiments described in the previous sections the acidity of the mascerated meat was not adjusted. It varied from about pH 6.1 to 6.5, with an average of about pH 6.3. The meat kept under toluol for 48 hours at 25° showed very little change, whereas that exposed to the action of bacteria from the gut and slime always became more alkaline, from pH 6.7 to 7.0, after 48 hours. Varying the initial acidity from pH 5.0 to 8.0 does not appear to produce a conspicuous influence upon bacterial decomposition. Autolysis, on the other hand, appears to be slightly increased by increasing the hydrogen ion concentration, and slightly retarded by increasing hydroxyl ion concentration within the above mentioned limits. Very few tests, however, were made. Higher or lower pH values were not tested.

Summary

1. It has been shown that there is a slight increase in non-coagulable and ammonium nitrogen in mascerated haddock muscle kept under toluol at 25° for 24 hours and a conspicuous increase in 48 hours.

2. Haddock fillets were found to be heavily infected with bacteria similar to those of the gut and slime of the fish.

3. Where these bacteria were permitted to develop in the fish muscle at 25° there was only slightly greater increases in non-coagulable and ammonia nitrogen during the direst 24 hours than produced by autolysis alone; but from the 24th to the 48th hour of incubation the bacteria produced a very much greater protein transformation than was produced by autolysis alone during the same period.

Standardizing the Provincial Death Rates

By Dr. A. C. Jost,

Chief Officer of Health, Province of Nova Scotia

A FORMER article (Public Health Journal, May, 1922) referred to the method of standardizing the death rates, and applied the method to the rates of the Canadian Provinces.

The standard used was that obtained from the figures of England and Wales during the period 1881-1890. The Canadian figures then obtainable were those which were the result of the census 1911.

Since the figures of the 1921 census have now been made known it is possible to complete the calculation for that year. The calculated figures of the years 1911 and 1921 having been obtained, it is further possible to estimate with a fair degree of accuracy (if we leave out of the calculations the alteration of population due to the war) the proportional changes taking place during each of the intervening years. These having been thus estimated, standardized rates for the ten year period may be obtained.

It will be seen that so far as Nova Scotia is concerned the census of 1921 again indicated a very unusual distribution of its population in the age and sex groups. This grouping is compared in the following table with that of the 1911 census, the table showing the distribution and sexes of the population per 1,000,000.

Ages	1911 Census Males	1921 Census Males	1911 Census Females	1921 Census Females
- 4	60,723	58,182	58,425	57,208
5- 9	57,152	58,258	56,167	56,120
10-14	53,502	55,965	51,822	53,445
15-19	51,767	49,576	50,238	49,503
20-24	44,943	41,115	43,625	42,523
25-34	72,255	68,029	65,796	66,065
35-44	57,471	59,795	52,902	54,237
45-54	43,401	48,920	41,709	43,788
55-64	32,991	33,387	31,834	31,492
65-74	23,528	22,534	23,097	21,781
75 and over	12,138	12,931	14,514	15,146
	509,871	508,692	490,129	491,308
	490,129			508,692
	1,000,000			1,000,000

This shows that the depletion of the young adult groups is still going on. There is a still greater reduction of the first age group (that up to the age of 4), while in the ages seventy-five and over there has been a material addition to the figures of the 1911 census.

We would, therefore, expect that the factor of correction for age and sex would not have materially altered, and this is found to be the case. It may be well worth while again to work out in detail the calculation, showing the way in which this factor of correction is obtained. The population figures used are the actual figures of the population of Nova Scotia, as determined by the census, corrected for those whose ages were not given. The mortality rates are, as before, those obtained from the England and Wales experience.

Age	Males	Females	E. & Wales Death Rate Males	E. & Wales Death Rate Females	Computed Deaths Males	Computed Deaths Females
4.....	30,478	29,967	61.59	51.95	1,877	1,556
5- 9.....	30,518	29,397	5.35	5.27	163	154
10-14.....	29,316	27,996	2.96	3.11	86	87
15-19.....	25,970	25,931	4.33	4.42	112	114
20-24.....	21,538	22,279	5.73	5.54	123	123
25-34.....	35,636	34,607	7.78	7.41	277	256
35-44.....	31,323	28,411	12.41	10.61	388	301
45-54.....	25,626	22,938	19.36	15.09	496	346
55-64.....	17,489	16,496	34.69	28.45	606	469
65-74.....	11,804	11,409	70.39	60.36	830	688
75 and over	6,774	7,934	162.62	147.98	1,101	1,174
	266,472	257,365			6,059	5,268

Total population, 266,472 plus 257,365 equals 523,837.

Total computed deaths, 6,059 plus 5,268 equals 11,327.

Death rate of computed deaths 21.57. The factor of correction then equals 19.15 (which is the actual England and Wales death rate) divided by 21.57, the computed Nova Scotia rate obtained as above. This division results in the fraction .887, which is the factor of correction. This factor was .886, according to the 1911 census.

In respect of the rural and urban distribution a similar process is followed. It will be seen that in the intervening 10 years there has been quite a material change in this respect in the Province, which change shows in the calculation.

	Nova Scotia	
	Urban Population	Rural Population
1911.....	186,128	306,210
1921.....	227,038	296,799

The England and Wales death rates for these grouping were 20.3 for the urban grouping and 17.3 for the rural. Applying these to the respective populations a computed death rate of 18.71 is obtained, from whence a factor of correction of 1.023 is the product of division into 19.15, the England and Wales rate. According to the 1911 census this factor was 1.039. The change in this factor shows that the province is more nearly approaching each year the condition of the standard, or, in other words is losing its rural population as industrialization proceeds.

Given these factors of correction for the years 1911 and 1921, it is easy to estimate the factors of the intervening years. If there is then taken the crude provincial death rates as they appear in the Canada Year Book, standardized rates may be obtained by multiplying the crude rates by the factors of correction, the results being as follows:

Crude and Standardized Death Rates, Nova Scotia

Year	Factor of Correction Age and Sex	Factor of Correction Urban and Rural	Crude Rate	Standardized Rate
1911.....	.886	1.039	16.73	15.40
1912.....	.886	1.037	14.34	13.17
1913.....	.886	1.035	14.52	13.31
1914.....	.886	1.034	15.01	13.75
1915.....	.886	1.032	15.20	13.89
1916.....	.887	1.030	15.84	14.47
1917.....	.887	1.029	14.82	13.52
1918.....	.887	1.028	17.71	16.14
1919.....	.887	1.027	17.73	16.15
1920.....	.887	1.025	14.5	13.18
1921.....	.887	1.023	12.3	11.16

It will be seen that in the years intervening between the 1911 and the 1921 census considerable alterations have taken place in the age and sex groupings of the various provinces as well as in the distribution of rural and urban grouping. These alterations have had their corresponding effect on the factors of correction as will be seen from the adjoined table. In each case the standard was the same, viz., the population of England and Wales for the period 1881-90.

Province	1911		1921	
	Factor of Correction Age and Sex	Factor of Correction Rural and Urban	Factor of Correction Age and Sex	Factor of Correction Rural and Urban
Nova Scotia.....	.886	1.039	.887	1.023
New Brunswick.....			.920	1.049
P.E. Island.....	.870	1.078	.816	1.067
Quebec.....	.965	1.021	.993	1.009
Ontario.....	.981	1.014	.963	1.005
Manitoba.....	1.103	1.028	1.078	1.030
Saskatchewan.....	1.123	1.058	1.123	1.054
Alberta.....	1.173	1.038	1.099	1.038
British Columbia....	1.213	1.015	1.089	1.023

From the factors of correction given in the above table, it is very easy to calculate a standardized rate from the crude rates, already a matter of record.

Radio Talks

Prepared for the Canadian Social Hygiene Council and delivered at CKCL Broadcasting Studio, Toronto

LET GOOD BOOKS HELP YOU TO HEALTH

By Mrs. A. A. Perry

This is the nineteenth of a series of talks being given through the courtesy of CKCL by speakers representing the Canadian Social Hygiene Council.

This talk is related to the Children's Book Week, just over, and the General Book Week, now on.

It deals with several new books on health; one of the very livest issues of the day. So do not cast off with the idea that a talk on health is sure to be dull. "Contrariwise", as Mr. Peggoty used to say, there are few subjects in the world at the present time so brimful of adventure, thrills and genuine achievement as the pursuit of the secret of perfect health. In this pursuit lies the whole story of Preventive Medicine, that ultra modern, scientific crusade against disease, which has already accomplished such marvellous things.

If you want tales of adventure read the stories of the devoted scientists in all civilized countries who are wresting from Nature herself, from the microscope and the laboratory, a hard won knowledge of what constitutes health and hygiene for all of humanity.

Consider the daring fights of a Pasteur of France, Nogouchi of Japan, Metchnikoff of Russia, or the achievements of General Gorgas in the fever-stricken Panama.

Consider the fight which knowledge has disclosed between man and the microbes of disease. In this fight, knowledge alone can conquer. We must know the strength and character of our enemies before we can attack them intelligently. Microbes, from being "little and unknown" a half century ago, are to-day recognized as of first importance to humans, for unless humans can learn how to control disease microbes and insect pests, the scientists say, these creatures may wipe out humans.

So we all have a great stake in Preventive Medicine. It is the path humans must tread to health and safety. Some glorious chapters in its history have been made by Canadians.

A Canadian bacteriologist, Felix Hubert d'Herelle, born in Quebec, is now a famous scientist in the Pasteur Institute in Paris. He has made great discoveries regarding the existence and habits of the beneficent

bacteria which consume certain disease bacteria. He calls them ultra microbes. Through this recent discovery it is now almost certain that new forms of inoculation will be perfected for the cure of dysentery, colds, boils or anthraxes. Think of being able to combat the far too common cold! This feat almost passes the imagination. But it is coming, and we hope soon. Drs. Banting, Best, Collip and MacLeod, of Toronto University, through the discovery of insulin, have dulled the sharp and deadly fangs of that disease dragon, diabetes. It was an exciting fight, and the Canadian scientists have won on the first round.

Then think of the hand to hand encounters going on every day with cancer, the octopus whose tentacles seize in our country one out of every eight women, one of every twelve men past middle life, and drag them to death.

Every day we hear echoes of this great battle. In thousands of laboratories it goes on. Some day soon, knowledge will conquer cancer. If you want to know how it's doing it, read Ellis Barker's Book on Cancer. There you will find demonstrated the connection between ignorance and this or other deadly diseases. Over-eating, wrong feeding, unwholesome living, all pave the way for cancer.

Cancer has many causes, but most of them spring from ignorance of how to eat, how to live, how to deal with the beginnings of disease.

If we would conquer disease, we must refuse to be ignorant of its nature, causes, cure. Think of how, in the middle ages when pestilence broke out, the people were herded into the churches to pray for deliverance. From this procedure, thousands of new infections resulted. Millions died, yet the only sin was ignorance.

So if you want to learn the way of Health the records of preventive medicine must be read. Books are your road to knowledge, and knowledge is indispensable if we are to attain personal and national health. Health is an achievement, not an endowment, and nowhere will you find more interesting reading to-day than among the Health books in your bookstore. I will speak of just four such books.

Let me then first direct the attention of parents to a book, "Yourself and Your Body", which they will find of immense usefulness to their children. It is written by a distinguished Canadian physician, Dr. Wilfred Grenfell, of the Labrador Mission, and published by the Copp Clark Company of Toronto. Dr. Grenfell, in his preface, frankly states that this attempt to teach young children the science of physiology is a venture. "Having two sons", said he, "who have just reached the age of a million 'whys', 'whens', and 'wheres', it occurred to me that they would respect the development of their bodies more if they knew more about them. If they are interested in bird studies and postage stamps, they should

certainly be interested in the structure and perfection of their bodies", so "Yourself and Your Body" was written. It is an admirable book. It met the needs and answered the questions of Dr. Grenfell's own children. It will do the same for your children. It meets a long felt want. It conveys scientific knowledge accurately. It is written interestingly in a style thoroughly suited to the child mind. Dr. Grenfell has illustrated the book himself, with the utmost humour and cleverness. Every chapter is fascinating. No child could fail to find it interesting. The volume is well produced in every sense of the word, well written, well bound, well printed, and of unusual pictorial craftsmanship.

"Yourself and Your Body" is a real and very valuable addition to a home library. It will help both parents and children to a better understanding of life, of anatomy, of health and right habits of living, and while doing so will amuse as much as it serves. Once more Dr. Grenfell has performed a great mission. He has made it easy for children to find the way to health.

Another book which can be heartily commended to persons who want to know all about marriage is "The Fruit of the Family Tree", by Albert Ernest Wiggan. It is published by the Bobbs Merril Company, of Indiana, and is dedicated to the "Health, Intelligence and Beauty of the Unborn". From its fascinating, but thoroughly scientific contents, you can learn:—

How germs are spread.

What characteristics or diseases are heritable.

Whether cousins ought to marry.

What inbreeding does to Royal or other families. How dominant traits are produced and transmitted.

Why you have blue or brown eyes.

Why you are fat or thin, tall or short.

That most of the generally accepted ideas about pre-natal influence have no basis in fact.

That the ignorance of the average woman or man regarding the actual laws of heredity is nothing short of colossal.

"The Fruit of the Family Tree" dramatizes and renders of live interest all the astounding discoveries made of late years about heredity in its relation to human progress.

It makes the knowledge of the biological laboratory of immediate personal concern to you and me.

It tells in everyday language, free from technicalities, all that is known concerning mating, marriage and heritable strains.

It is a revelation of the laws of life.

It shows that brains, beauty, intelligence, and even the capacity to succeed, are as heritable qualities as insanity, epilepsy or feeble-mindedness.

It points the way to racial improvement. It defines eugenics as simply the application of human intelligence to human evolution.

Filled with interesting illustrations it tells inspiring tales of many of the great ones of the earth, and deals with the production of genius.

It is a genuine contribution to the study of what Bernard Shaw calls the Life Force. It ought to be vastly helpful to everybody. "The Fruit of the Family Tree" is heartily commended to all who are interested in self improvement, family improvement, race improvement.

Housewives! Attention

A third book, called "Feeding the Family", deals with one of the fundamentals of all health and hygiene, the problem of nutrition.

Do you know that Sir Arbuthnot Lane, the great English Surgeon and Medical Authority, after a lifetime devoted to operative surgery, has stated recently that in his opinion cancer is a "filth" disease and is directly connected with wrong feeding of the body.

It arises, he says, from body poisoning through faulty elimination of waste products.

This poison or "filth" is responsible for the production in the body of those Bolshevik cells, those revolutionary growth results in the devastation of the body in cancer.

To-day, this great scientist is pinning all his medical faith to diet as the final solution of the cancer problem, and is engaged in preaching a doctrine to English housewives of more brown bread, more vitamin-laden foods, more bulky vegetables, more intelligent feeding. So the revised edition of "Feeding the Family" is an important book dealing with a most important aspect of Preventive Medicine.

It is written by Mary Swartz Rose, Ph.D., Professor of Nutrition, Teachers' College, Columbia University, and is published by the MacMillan Company, of New York and Toronto.

It is keyed to the text that "the health of the family is largely in the hands of the one who provides the three meals a day".

This book is of first rate value because it is not only scientific, but practical. It relates science to the actual kitchen of the actual housewife. It shows her how to lighten her worries, how to get a maximum of nourishment with a minimum of effort.

It places the job of housewife where it rightly belongs, among the learned professions. It puts dietetics on the level of its fellow sciences, chemistry and bio-chemistry.

Yet it is a plain useful book for all housewives.

Subjects dealt with include: The Significance of Food, Care of the Digestive Machine, Food for the Adult Man, the Baby, the Young Child, the Mother, the Older Child, the Adolescent, Food after Fifty, Food for the Family Group, Food for the Sick or Convalescent, with particular diets for particular diseases, such as Diabetes or Tuberculosis, Food as Fuel, Costs of Food in relation to Nutritive Values.

A list of Food plans is offered for: The Sedentary Man, The Muscularly Active Man, The Thin Man, The Fat Man, The Thin Woman, The Fat Woman, The Nursing Mother, and for The Elderly or Very Old Person.

Such a book as "Feeding the Family" is to-day indispensable in all well-managed households, as the intelligent housewife begins to understand that Health in relation to Food can be achieved only through a scientific knowledge of dietetics. We heartily commend this book to her.

Our last book, "Health and Disease and Their Determining Factors", by Roger J. Lee, M.D., Professor of Hygiene, Harvard University, is published by Longmans, Green and Co., Toronto. It is a new and noteworthy volume.

It announces itself as a text book on hygiene and preventive medicine, but the angles from which it discusses the principles laid down are very different from those of the usual high-brow academic writer.

It is addressed to the individual layman or laywoman. Public health workers also will find in it a mine of instruction. Indeed the doctors themselves may get from it a new viewpoint.

The book bristles with useful information. All its facts or conclusions are presented in a singularly impartial way. Misbeliefs, even medical misbeliefs, meet with no kindness at the hands of the writer. They are unqualifiedly denounced. The path of health is shown to be the straight and broad path of science, and it is made clear that the average layman or laywoman is quite as capable of comprehending the underlying principles of health and disease, once he is told what they are, as the average doctor.

Furthermore, the heads of families who have to pay doctors' bills and the communities' medical bills in taxes are entitled to a thoroughgoing knowledge concerning the problem of personal, family or public health.

The author does a good deed in warning people against adopting patent recipes for health without understanding the basic factors governing health and disease.

He shows that knowledge is the only way to real understanding, and he presents such knowledge in its most practical and ordinary form. A

strong chapter in the book is that on Alcohol, Tobacco and the Habit-Forming Drugs. In Canada, where we are gaining a reputation as one of the big drug peddling nations of the world, this chapter has many home applications.

The purely public health angles of this book are divided into: Disease Transmitted by Ingestion, The Air Bone Diseases, Diseases Transmitted by Contact, Venereal Diseases and Sex Hygiene, Insect Borne Diseases, Mysteriously Conveyed Diseases, Cancer, Occupational Diseases, and General Considerations in Communicable Diseases.

We recommend this "Lee" Book on Health very strongly. It is distinctive, clear, concise, accurate, up-to-the-minute, and written in a very properly respectful attitude toward the lay mind.

We advise getting it. It will certainly broaden your ideas concerning life, and how to lengthen it.

This talk is one of a series given every Tuesday evening at 9.15 p.m., by speakers of a panel of the Canadian Social Hygiene Council. If you want any information regarding these speakers or matters mentioned to-night, it will be cheerfully given by addressing the Division of Education, Social Hygiene Council, Hygeia House, 40 Elm Street, Toronto.

The Provincial Board of Health of Ontario

Communicable Diseases reported for the Province for the Weeks ending October 5th, 12th, 19th, 26th, 1925

COMPARATIVE TABLE

Diseases	1925 Cases	1925 Deaths	1924 Cases	1924 Deaths
Cerebro-Spinal Meningitis	..	1	10	8
Chancroid	1	..	3	..
Chickenpox	859	..	1076	..
Diphtheria	279	19	494	37
Encephalitis	..	4	1	1
Gonorrhoea	142	..	191	..
Influenza	..	14	..	8
German Measles	4	..	44	..
Measles	530	..	1037	4
Mumps	306	..	641	..
Pneumonia	..	177	..	153
Poliomyelitis	3	..	20	2
Scarlet Fever	514	4	736	10
Small Pox	31	..	21	..
Syphilis	105	..	142	..
Tuberculosis	139	75	165	63
Typhoid Fever	76	10	89	11
Whooping Cough	130	3	488	5

The following places reported cases of small pox: Toronto, 1; Kingston, 1; Kitchener, 7; Belleville, 2; Eganville, 4; Fort Francis, 1; Wilberforce Tp., 2; Grattan Tp., 5; Sherwood Tp., 3; Bromley Tp., 1; Bagot and Blythfield Tps., 2; Dummer Tp., 1; Cobden, 1.

JOHN W. MCCULLOUGH.

Sanitary Inspectors' Association of Canada

PUBLIC HEALTH NURSING IN MANITOBA

By Miss E. Russell, R.N., A. R. San. I.,
Superintendent of Provincial Public Health Nurses, Manitoba

Habits affect health. As a proof of this you have only to study the Sanitarium treatment for Tuberculosis, and the training of athletes. To the extent that we can improve individual habits of living, we can improve the health status of a community. The importance of the acquirement in childhood of health habits, a knowledge of the laws of personal hygiene, general care of the body in health and disease, proper diet, simple sanitation, and disease prevention cannot be over-estimated.

There is sufficient health knowledge now in the world to reduce the disease and death-rate to a marked degree. But this knowledge can only be effective when it is applied. It must be reduced to simple terms of habits of living and must be instilled into every man, woman, and child, but particularly the children in our schools, for childhood is the period of habit formation, and the alteration of habits of life after maturity is difficult, and usually only comes about through the manifestation of illness or the loss of physical or mental power and endurance. There is no form of individual education of more value than that which teaches the main conditions of a healthy life.

How has the meaning of Public Health been interpreted by the Provincial Health Department?

By Order-in-Council, dated April 4th, 1916, the Provincial Board of Health was re-organized.

The Board at its first meeting decided on a vigorous programme and campaign of education in the interest of Public Health, and inaugurated the plan of Provincial Public Health Nursing, six nurses being appointed that year. These nurses were engaged in Public Health Survey work at ten provincial points during the year.

In July, 1916, the Provincial Nursing Department displayed their first Health Exhibit at the Brandon Fair, which was reported as one of the chief attractions there.

On March 1st, 1917, a Superintendent of Nurses was appointed.

During 1917 the Public Health Nursing staff was increased to fifteen,

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Read before the Annual Convention in Winnipeg, Manitoba.

and the most important regulation passed by the Board that year prohibited the use of the common cup and towel in public places.

The subject of infant mortality had engaged the serious consideration of the Board for some time, and in 1918 the first Child Welfare Station under the auspices of the Provincial Board of Health was opened.

The activities of the nursing staff now included:—

Infant and Child Welfare Work.

Instruction to expectant mothers.

Health Inspection in schools.

The formation of Little Mothers' Leagues in the schools, among senior girls.

Discovering, reporting and instructing in Communicable Disease work.

Nursing care in emergency and time of epidemic.

In December, 1918, the nursing staff numbered 16.

In July, 1919, an assistant Supervisor of Nurses was appointed.

Regulations for Public Health Nurses and qualification of applicants for the Nursing Staff were drawn up and approved by the Board. The regulations are as follows:—

(*a*) All applicants must be graduates of a recognized training school which provided not less than a three years' course in surgical, medical and obstetrical nursing.

(*b*) Two years of high school, or its equivalent.

(*c*) A registered nurse, or eligible for registration.

The applicant for appointment shall be on approbation for three months before being transferred to the regular staff.

New work undertaken during the year included:—

Courses in "Home Nursing and Child Welfare" to groups of women and older girls.

Child Health Conferences in connection with Summer Fairs.

Courses of Lectures to Normal Students in, "Home Nursing, First Aid, Preventive Medicine and Public Health".

The introduction of the Health Chore Crusade teaching in schools where Public Health Nurses were stationed.

The Nursing Staff in December, 1919, numbered 36.

1920. Public Service Nursing.

In June, 1920, an agreement was made with the Manitoba Branch of the Canadian Red Cross Society whereby three nurses of the Provincial Nursing Staff would be stationed in unorganized or isolated districts. The nurses were controlled and supervised by officials of the Provincial Board of Health. A committee of two members from the Red Cross and two from the Provincial Nurses' Department managed this branch of work. The Manitoba Red Cross Society provided the furnishings of the

cottages or rooms where the nurses were stationed, also salary, expenses and equipment of the nurse. The nurse's residence contained a hospital ward which was also used as a health centre. Three remote rural districts were decided upon.

Activities:—

(*a*) Community Nursing.

1. Answer all emergency calls.
2. Answer all night calls when escort is provided.
3. Home to home bedside nursing.
4. Assist or take charge of obstetrical cases as may be necessary.
5. First aid surgical dressings and treatment to patients at nurse's residence as may be deemed advisable.

(*b*) Public Health Nursing.

When there is no health officer.

1. Investigation of sources of all communicable diseases.
2. Take all throat cultures for release of diphtheria cases, or other communicable diseases.
3. Assist in quarantine and supervision of communicable diseases.
4. Report to Superintendent of Public Health Nurses all cases of communicable diseases and insanitary conditions.
5. To make use of Provincial Board of Health Laboratory.
6. Where no Public Health Nurse is appointed, all of the duties of a Public Health Nurse.

(*c*) Social Service work: To co-operate with and secure aid from social agencies, when medical and social problems arise.

(*d*) The radius of the district which a nurse may be expected to cover is from fifteen to twenty miles from nurse's residence.

Venereal Disease Nursing.

In March, 1920, a nurse was appointed for work in connection with the Winnipeg General Hospital Venereal Disease Clinic. Part time work at the Private Provincial Board of Health Clinic was done by one of the nursing staff until August 1, 1920. From that date a nurse has devoted her full time to the work.

New work undertaken during the year.

Dental Clinics opened in three districts in the province.

Children inspected for communicable disease before leaving Winnipeg for camps, maintained by various Church and Social Agencies.

The Manitoba Baby Book was compiled, also Diet Cards for Children.

The Nursing staff in December, 1920, numbered 43.

1921. In October the regulations governing the licensing and supervision of Private Maternity Homes, Baby Boarding Homes, and Day Nurseries, were passed by the Board, and a member of the Nursing staff was appointed to carry out inspections and supervision required under the regulations.

In connection with the Public Health Education work a scenario was written and filmed, entitled, "Public Health Nursing in Manitoba".

From the inception of the Public Health Nursing staff, until 1921, a two weeks' course of lectures and conferences was arranged for December of each year, in order that the nurses might be fully conversant with the newest teaching on Public Health, Prevention of Disease, and Child Care.

In December, 1921, the course was given under the auspices of the University of Manitoba, Extension Department. The chief thought in the minds of those who arranged for this, was that it might be the nucleus of a definite course for nurses for which a diploma would be given.

In December, 1921, the Provincial Nursing Staff numbered 50.

1922. This year showed the greatest extension of Public Health work since its inception. School inspectors and teachers throughout the province were staunch supporters of the nurse's work. The Health Crusade was established in practically all schools in the Nurses' Districts, and, as a result of educational work among the teachers, this form of health teaching was established and carried on by enthusiastic teachers in twenty-six schools not in Public Health Nursing Districts.

The lecture courses to students in all Normal Schools of the province was an established thing.

Dental clinics were in full swing at Brandon and Portage la Prairie.

Seventeen Child Welfare Stations were in operation throughout the province.

Child Health Conferences conducted by this Department were held in connection with most of the summer fairs. Four Winnipeg Child Specialists were on call for the examination of children, all charges in connection with the Specialist's services being paid by the district he served.

The nurses co-operated with all public and private social and child welfare agencies, in connection with their work.

(*Te be concluded in the January Number*)

The Sanitary Inspectors' Association of Canada

CORRESPONDENCE

Editor, THE PUBLIC HEALTH JOURNAL,

Sir:—I was much interested in the paper of Mr. A. R. White, in the October issue, entitled, "The Education of Your Sanitary Inspector". I understand that Mr. White had the privilege of reading it before the Association of Ontario Health Officers. A better audience could not have been chosen, because until Health Officers are convinced of the necessity for ensuring that all persons appointed as Sanitary Inspectors shall be properly educated and trained for their work, Health Officers will be handicapped, and the advancement of sanitary science will be slow.

Mr. White's paper might convey the impression to some that there are not any qualified Sanitary Inspectors in Canada. I do not know how it may be in Ontario, but in Western Canada the majority of Inspectors are certified men, some of them of many years' experience in public health work in this and other countries. There are plenty of such men to be got, and the wonder is that municipal authorities will continue to appoint any others. Naturally, in Canada, we wish to employ Canadians, and not to be obliged to bring in Sanitary Inspectors from England or other countries, but Sanitary Inspectors just as efficient can be trained in Canada, once this subject is given the necessary consideration by authorities.

If the legislatures of the various provinces were to follow the example of Saskatchewan, which has inserted a provision in the Public Health Act of that province, requiring that all persons appointed as Sanitary Inspectors shall possess a certificate of proficiency in sanitary science granted by a recognized examining body, this might lead to some improvement. It would bar many inefficients—sometimes appointed through influence.

The City of Winnipeg has had a By-law requiring such certificate for many years, with much beneficial result to the Health Department of that City.

Certificates of competency are the rule in Great Britain, Australia, New Zealand, and other places in the Empire.

Once such certificates were made obligatory in Canada, many candidates for examination would be forthcoming, and means would be found for training them to pass the examination.

I do not want to criticize Mr. White's excellent address, except to correct a few misconceptions about the Royal Sanitary Institute.

The Institute commenced in 1877, the Sanitary Inspectors' Examination (formerly called Nuisance Inspectors) subsequently undertaking six or seven other forms of examinations, such as Meat and Food Inspectors, Smoke Inspectors, Health Visitors, School Hygiene, Advanced Sanitary Science, etc. Branches of the Institute have been formed with examining boards in almost all parts of the Empire, and the certificates of the Institute are recognized by all sanitary authorities as a proper qualification required precedent to appointment.

In Canada, there are Examining Boards of the Royal Sanitary Institute as follows:

Quebec—(Dr. Starkey, Hon. Sec.)
Ontario—(Dr. Hastings, Hon. Sec.)
Manitoba—(E. W. J. Hague, Hon. Sec.)

and also in Saskatchewan and Alberta. During the last 40 years, 28,298 candidates have sat for examinations of the R.S.I., and of these 15,042 passed.

The Institute is not a teaching body, except in London, where all their training courses of lectures for Sanitary Officers are given.

In Manitoba, nearly all our candidates have prepared themselves for examination by private study, although in Winnipeg it has been usual for classes to be formed under the tuition of a well qualified Inspector.

I wish to commend Mr. White's scheme for the establishment of classes for Sanitary Inspectors in connection with some recognized school of hygiene. For inspectors who could manage to attend such courses as might be arranged in the large cities under the auspices of our universities, the classes might be of immense service.

I think, however, that seeing we already have examining boards of the R.S.I. in Canada, they should be made more use of, and the certificate of the R.S.I. made the standard for all parts of Canada, although not exclusively.

The syllabus for the examination embraces such a wide spread of subjects that I think the preparing of candidates for examination can best be undertaken by an experienced Sanitary Inspector.

The examination is not difficult—three months' study should suffice an earnest student. The practical knowledge required before entry is generally acquired by acting in a voluntary capacity under some M.O.H.

Making compulsory the obtaining of such a certificate would:

(*a*) Ensure that candidates for positions as sanitary inspectors had received a certain amount of education and training.

(*b*) Prevent the appointment of persons entirely ignorant of sanitary science and sometimes quite unsuitable in other respects.

(*c*) Give the successful candidates (we hope) an idea of the vistas of knowledge yet to be attained, and make them anxious to continue to study, with a view to obtaining one or more of the advanced certificates issued by the Institute.

It would be good for the men themselves; good for the Health Officers, who would have more efficient assistants; good for the municipal authorities, who would get better service for the monies they pay out; and of benefit to the community.

ERNEST W. J. HAGUE.

Winnipeg, November, 1925.

News Notes

The Alberta Hospitals Association and the Alberta Registered Nurses' Association held their annual conjoint meeting in Calgary on November 12th and 13th.

Chief among the speakers was Miss Mabel Gray, Director of Nursing, University of British Columbia. Miss Gray delivered two splendid papers. Her paper to the Registered Nurses dealt with the "Advisability of the Training School in the Small Hospital", and to the conjoint Convention, "Problems of the Small Hospital".

Miss Gray's long experience in connection with Training Schools for Nurses and small hospitals in the West has well fitted her to speak with authority on these subjects.

Dr. H. W. Hill, on leave from the University of Western Ontario, has, since July 1st, 1925, been Director of the Laboratories of the Vancouver General Hospital, and also Professor of Bacteriology and of Nursing and Health (Departments of the Arts Faculty and of the Applied Science Faculty respectively) in the University of British Columbia, Vancouver, B.C.

These three pieces of work fit well with each other and are developing in co-ordination with each other at a rapid rate. The University is moving into palatial quarters at Point Grey, the most magnificent campus in Canada, if not in North America—a wooded peninsula extending into the Gulf of Georgia, the mountains on one side, the great Delta of the Fraser River on the other.

Montreal held, during the first part of November, a local Conference on Social Work. A large attendance throughout attested to the interest in the programme provided, which included four addresses from the Health Section, which was represented on the Programme Committee by Doctor A. Grant Fleming. These were as follows: Dr. J. A. Amyot, Deputy Minister of Health, Canada, on "What a Public Health Programme Offers to Montreal"; Dr. W. T. B. Mitchell, Director, Mental Hygiene Committee of Montreal, on "Mental Hygiene: Its Place in To-day's Social and Medical Programme"; Dr. J. J. Heagerty, Director, Division of Venereal Disease Control, Dominion Department of Health, on "Communicable Diseases"; Dr. R. St. John Macdonald, Department of Hygiene, McGill University, on "Ventilation".

At the Annual Meeting of the Canadian Social Hygiene Council, held in Toronto on December 11th, the following officers were elected for the ensuing year:

President—Hon. Mr. Justice Riddell, Toronto.

Vice-Presidents—Hon. Dr. Forbes Godfrey, Toronto; Dr. J. Halpenny, Winnipeg; Hon. Dr. W. F. Roberts, St. John; Dr. A. C. Jost, Halifax; Hon. Dr. H. I. Taylor, New Brunswick; Dr. J. W. S. McCullough, Toronto; Mrs. Arthur Murphy, Edmonton; Dr. M. M. Seymour, Regina; Dr. Chas. Hodgetts, Ottawa; Mrs. A. M. Huestis, Toronto; Dr. W. C. Laidlaw, Edmonton; Dr. H. E. Young, Victoria.

General Secretary—Dr. Gordon Bates, Toronto.

Honorary Treasurer—L. M. Wood, Esq., Toronto.

Members of Board—Dr. J. A. Baudouin, Montreal; Rev. H. T. Archbold, Victoria; J. J. Gibbons, Esq., Toronto; Fred Smith, Esq., Toronto; Dr. J. G. Fitzgerald, Toronto; Dr. H. W. Hill, Vancouver; Dr. A. K. Haywood, Montreal; Dr. J. A. Hutchinson, Westmount; Dr. A. M. Davidson, Winnipeg; Mr. A. F. C. Fiske, Ottawa Dr. A. Primrose, Toronto.

Chairman of Provincial Committees—Nova Scotia: Dr. Joseph Hayes, Halifax; Prince Edward Island: Dr. I. H. Yeo, Charlottetown; Quebec: Dr. A. H. Desloges, Montreal; Ontario: Mr. A. E. S. Smythe, Toronto; Saskatchewan: Dr. E. B. Alport, Regina; Manitoba: Major C. K. Newcombe, Winnipeg; Alberta: Dr. Heber Jamieson, Edmonton; British Columbia: Mr. H. T. Ravenhill, Victoria.

A Board of Honorary Advisory Directors to undertake the supervising of the financing of the Council throughout Canada was also appointed as follows:

TORONTO: Mr. E. R. Wood, Mr. H. H. Williams, Col. A. E. Gooderham, Mr. G. A. Warburton, Mr. Gordon Osler, Mr. H. C. Cox, Mr. R. Y. Eaton, Mr. J. Allan Ross, Mr. J. P. Bickell, Mr. C. S. Blackwell, Hon. Dr. Forbes Godfrey. MONTREAL: Sir Frederick Williams Taylor, Mr. J. W. Ross, Lord Atholstan, Mr. E. W. Beatty, Sir Arthur Currie, Sir H. Laporte, Mr. Du Tremblay, Mr. Raymond, Dr. Harwood, Sir Henry Thornton, Hon. L. A. David. OTTAWA: Mr. A. F. C. Fiske. QUEBEC: Hon. Frank Carrol.

Book Reviews

"Keeping in Condition", by Harry H. Moore. The Macmillan Company, Toronto and New York. Price $1.35.

"Keeping in Condition" is a handbook of training for older boys, with the text that "training for manhood involves the development and conservation of virility". So it is essentially a book keyed on underlying principle of social hygiene. As Clark W. Hetherington, of the University of Wisconsin, says in his preface, "It shifts a large part of sex hygiene from a position of awkward isolation to its natural place as a phase of an idealized yet practical programme of training, a training in which the boy's interests and enthusiasms are high. It points the way to a programme of training now used by many expert leaders of boys to relieve them of the sex excitation and temptations which Jane Addams characterizes so clearly as part of the dangers of our present day social life".

While this angle of training for health is presented, and all the perils of disease or depleted virility clearly show, the sex factor is not unduly stressed by Mr. Moore. What is stressed is "that at maturity the gates of all the more fundamental forms of education are closed. The adult can only conserve the powers that youth has given him".

Therefore, the boy in the most vital sense is inescapably the father of the man. Mr. Moore, through interesting illustrations drawn from the lives of many great men, points to the real sources of virility, connects the boy's ideals for himself with those of the natural life, and definitely links the individual boy with that racial progress of which he should be an integral self-conscious part.

The author of *"Keeping in Condition"* is to be congratulated on having produced in this short, concisely written volume, a book which may be of the greatest usefulness to not only the boy from fourteen to nineteen, but to all teachers, leaders and parents who desire to inculcate in growing boys right habits of living, a scientific acquaintance with the life forces, and how best to assist them to their fullest and finest expression.

Editorial

ACCIDENTS AMONG CHILDREN

The menace of fatal accidents is concentrated very largely on the period of early childhood. Figures for the country at large show this clearly. Among Metropolitan Industrial policyholders during the year 1923 there were no less than 9,258 accidental deaths and nearly one-fourth of them occurred among children under ten years of age. This ratio is for all accidents. It would be even higher if we were to leave out of consideration the deaths from certain forms of accident to which children are not liable, namely, those casualties which are due wholly or largely to the dangers of certain occupations.

The disclosures for certain forms of fatal accidents are of particular interest. For example, deaths from accidental burns, exclusive of those received in burning buildings, totalled 930 in 1923, and 57 per cent. of the decedents were under ten years of age, as compared with 7.6 per cent. between ages 60 and 70, the age period which ranks next in importance to that of early childhood with respect to accidental burns. Burning buildings, as well, take a heavy toll of child life, 35.6 per cent. of all the deaths among Metropolitan policyholders in 1923 having been recorded among children under ten. Child life is also the most important age with respect to accidental poisonings, the record for the year studied showing that 39.4 per cent. of all the deaths were in this same age group. The nearest approach to this for any other period of life was 16.3 per cent, for persons aged 20 to 29 years. Other very important forms of accident which took a heavier toll in early childhood than at any other time of life were accidental drownings (21.4), was higher than for any other ten year period save 10-19 (39.0). Deaths by gunshot wounds were more important thus early in life than at any other time, except in the two groups 10-19 and 20-29 years. With respect to street car accidents, only a single age group, between 30 and 40 years, showed a higher per centum of all the deaths than the period of early childhood. Relatively few children died from excessive cold, but child life suffered heavily from excessive heat, nearly one-fifth of the deaths in this insured group having occurred among those under ten years of age.

There are certain others forms of accidental death which, although not bulking large from the standpoint of numerical importance, nevertheless record a high ratio of their mortality among young children. Among these may be mentioned poisoning by food, with 45.7 per cent. of all deaths; poisoning by venomous animals, with 42.9 per cent.; acct-

dental mechanical suffocation, with 50.8 per cent.; wounds by cutting or piercing instruments, 16.3 per cent.; and injuries by animals, 23.3 per cent., of the total mortality in this experience.

These comparisons show how important it is that more attention be paid to movements for the prevention of accidents in early life. The safety movement should direct its attention to the frightful accident death toll in this age range just as vigorously as it does to the control of occupational accidents. It has been computed that the loss of life expectancy from accidents is between one and one-half to one and three-quarters years for males, and about two-thirds of a year for females. The greatest loss takes place between ages one and two years, or at a point where the effect on the expectancy of life is greatest.—*Statistical Bulletin,* Metropolitan Life Insurance Company.

SUICIDE AND AGE

Suicide in the white wage-earning group of the American and Canadian populations is approximately two and a half times as frequent among men as among women. This is shown by the experience of the 16 million policy holders of the Metropolitan Life Insurance Company. When the suicide data are studied by age periods, however, the ratio of deaths of males to those of females varies greatly at different periods of life, and the preponderance of self-murder among males increases perceptibly with advancing age.

Suicide does not assume much numerical importance until age 20 is reached. Between 20 and 24, the death-rate for males approximates one and a half times that for females. Between ages 25 and 34, the ratio is a little more than two to one; during each of the next 10-year periods, it is about 4 to 1; at 55 to 64, it approximates 5 to 1; and after age 65, there are about 7 times as many suicides among men as among women.

One age period, namely, 15 to 19 years, stands out in bold relief from the rest. This is the only time of life in which suicide is more common among females. In 1923, the suicide rate of young women of these ages was 4.1 per 1,000,000, or nearly two and one-half times that for males (1.7). It is interesting to note that more than half of the young women who took their lives at these ages, used solid or liquid poisons, and that substantially one-quarter died by inhalation of poisonous gas. At every age period of life up to 45 years, in fact, women suicides used poisons as lethal agents more than any other method; poisonous gases ranked next. From age 45 to age 65, inhalation of gas was the means most used. Among males, on the other hand, shooting is the method most generally employed, and this seems to hold for all of the age periods up to age 65. —*Stat. Bull.,* Met. Life Ins. Co., 6:1-2 (June), 1925.

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To Become Wealthy

At Age 65—

ONE only will be wealthy—

FOUR will be well-to-do and able to enjoy comfort and recreation—

FIVE will still be working for a living, with no prospect of relief from drudgery—

THIRTY-SIX will have died; in many cases leaving families enduring hardships—

FIFTY-FOUR will be dependent on friends, relatives or charity.

Is an Ambition That is Cherished by Many.

You, perhaps, have the same ambition At least, you want to be well-to-do later on, and able to enjoy comfort and independence.

What Are Your Chances?

Experience shows that of 100 average healthy men 25 years of age, the following will be true at 65:

1 only will be wealthy.
4 will be well-to-do.
5 will be compelled to go on working for a living.
36 will be dead.
54 will be dependent upon friends, relatives or charity.

Make Your Future Secure

There need be no such uncertainty about *your* future if you adopt the safe and definite plan of setting aside a deposit regularly each year for a Canada Life "Endowment at 65".

It will guarantee you in cash at a time when it will be most welcome the sum of $2,000—$5,000—$10,000 or more.

The full amount of your policy will be paid in any case, whether you live or die. Other investments may depreciate in value or fail—

The Endowment at 65

is a certainty. It will take care of your home, your business, or your personal interests, as nothing else can.

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Dear Sirs—On the understanding that I will be under no obligation you may send me particulars of your "Endowment at 65".

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Born_____ day of _____

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